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house tower at Alexandria, they put up a modified form of the temple towers they had seen in Babylonia, which thus became the ancestors of the church spires of Europe. When the Greek architects desired the model of an administrative building they adopted the clerestory of the Egyptian temple, and this important architectural element thus entered Europe to become part, and indeed the most characteristic part of the Christian cathedral.

THE STRUCTURE OF THE ATOM

At the meeting of the National Academy of Sciences, an hour was devoted to an address by Dr. Irving Langmuir, of the General Electric Company, which attracted much attention, it being said that there were present to listen to it as many as four hundred chemists and physicists from the Bureau of Standards. Dr. Langmuir's hypothesis on the arrangement of the electrons in atoms correlates a number of different proposals concerning the possible structure of atoms, and substitutes one general theory which indicates that the electrons do not revolve about the nucleus of the units of matter, but are stationary.

The new theory is based on the theory of Rutherford and the more recent theory of G. N. Lewis. It extends the original conceptions which assume that the atom is constructed on a nucleus of about a millionth of the diameter of the atom, which itself is about one hundred-millionth of an inch in diameter. The atom is made up of negative electrons arranged about the positively charged nucleus.

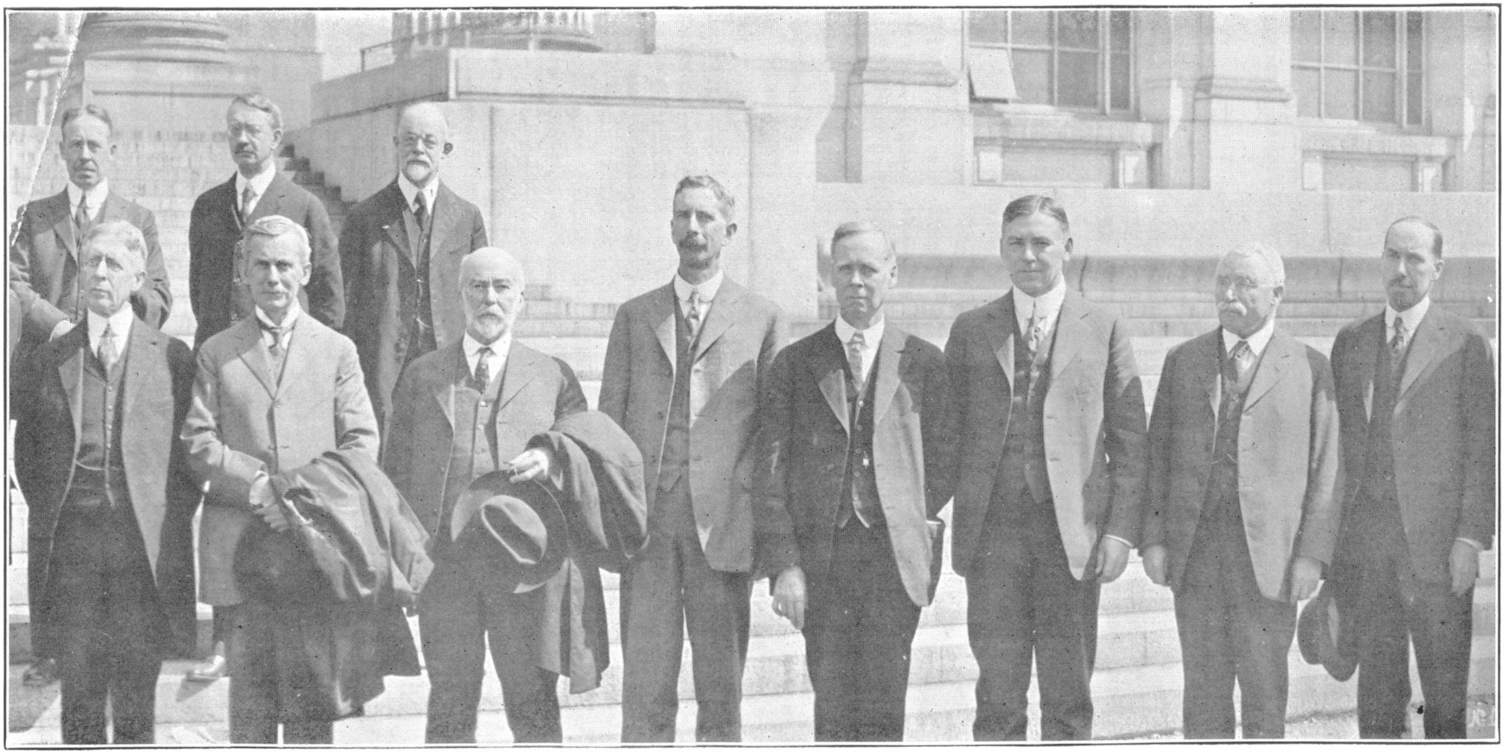
The atoms of different elements have different charges on their nuclei and they are thus capable of holding different numbers of electrons. This permits the arrangement of atoms of elements in a definite order with a difference of one electron each. For example, the first element in the scale is hydrogen, with an atomic number of one. Helium is next with a difference of one and is designated as 2. Thence up the scale through all the elements to uranium with 92 electrons.

Dr. Langmuir, starting with the known properties of the elements, has tried to determine what the arrangements of the electrons about the different nuclei must be to account for the properties of the elements themselves. He assumes that these electrons are not rotating about the nucleus, but that they are stationary and arranged in three definite dimensions in a lattice-work pattern of geometrical form.

All the atoms of the inert gases, such as helium, argon and radium emanations, are stable, and exist in a form having a symmetry like that of a tetragonal prism. With these and other simple assumptions, Dr. Langmuir finds the general features of atoms, their chemical and physical properties, well explained. Thus he discovers why iron and nickel are magnetic, and explains the properties of rare earth elements which chemists have never satisfactorily placed in the periodic table.

His theory leads to a new conception of chemical combination and modifies some of the simplest chemical facts and formulas. The structure of nitrogen, for example, with its inert properties, is explained. A molecule of nitrogen has a structure similar to that of an atom of argon. In organic or carbon compounds this theory applies particularly well. It explains the ordinary theory of valence and indicates when this must be modified.

Chemists have had trouble with organic compounds containing nitrogen. The structures of many compounds were puzzling, and never agreed upon. The new theory, how-



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ever, is said to clear up these points and show wherein the difficulty lay. Nitrogen was given a valency of 3 or 5, but the new theory shows that it is never 5, but 3 or 4. According to Dr. Langmuir no element can have a valency of over 4.

His theory leads to a new theory of valence, called the "Octet Theory," which is said to explain satisfactorily complex inorganic compounds, previously understood only by the application of Werner's theory. This theory has been received sceptically on account of its artificial assumptions, but the new "octet" theory shows the old theories were practically correct, but need modification in certain instances. The old organic and inorganic theories are correlated into one simple theory, indicating that electrons do not revolve. Dr. Langmuir also revises Bohr's theory of stationary states which was believed to explain the spectrum, showing that while his results were correct, the theory was wrong.

SCIENTIFIC ITEMS

We record with regret the death of Dr. George Ferdinand Becker, geologist of the U. S. Geological Survey since 1879; Joseph Barrell, professor of structural geology at Yale University, and of Charles Brinkerhoff Richards, for twenty-five years Higgins professor of mechanical engineering at Yale University.

The National Research Council announces the appointment of James Rowland Angell, dean of the faculties, and professor of psychology in the University of Chicago, as chairman of the council for the year commencing July 1, 1918. Dr. Angell succeeds Dr. George E. Hale, director of the Mount Wilson Solar Observatory of the Carnegie Institution of Washington, who has directed the affairs of the council during the war, and who resigned as chairman on April 30, to return to California. Dr. John C. Merriam, professor of paleontology in the University of California, who has been acting chairman of the council at various times, will direct its affairs until Dr. Angell assumes office in July.

The American Philosophical Society will procure a portrait of the late Edward C. Pickering to be hung in the hall of the society "as a token of the affectionate regard in which he was held by his fellow members." Professor Pickering was a vice-president of the society from 1909 to 1917.

The National Academy of Sciences has elected members as follows: Professor Joseph Barrell, whose death is recorded above; Professor Gary Nathan Calkins, zoologist, Columbia University; Professor Herbert D. Curtis, astronomer, Lick Observatory, University of California; Gano Dunn, electrical engineer, New York City; Professor Lawrence J. Henderson, biologist, Harvard University; Professor Reid Hunt, pharmacologist, Harvard University; Professor Treat Baldwin Johnson, chemist, Yale University; Professor W. J. V. Osterhout, botanist, Harvard University; Dr. Frederick A. Seares, astronomer, Mount Wilson Observatory, Mount Wilson, California; Professor William A. Setchell, botanist, University of California; Major General George O. Squier, electrical engineer, chief army signal officer, Washington, D. C.; Professor Augustus Trowbridge, physicist, Princeton University; Professor Oswald Veblen, mathematician, Princeton University; Professor Ernest J. Wilczynski, mathematician, University of California; Professor Edwin Bidwell Wilson, mathematical physicist, Massachusetts Institute of Technology.